

REMARKS

This is a full and timely response to the outstanding non-final Office Action mailed November 24, 2006. The Examiner is thanked for the thorough examination of the present application. Upon entry of this response, claims 1-28 are pending in the present application. Claims 1-4, 6-7, 13-18, 20-21 and 27-28 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Amrany* et al. (U.S. Pat. No. 6,999,504, hereinafter "*Amrany*"). Furthermore, claims 8-10 and 22-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Amrany* in view of admitted prior art in the disclosure. Finally, claims 5, 11-12, 19 and 25-26 are objected to as being dependent upon a rejected base claim.

Applicant respectfully requests consideration of the following remarks contained herein. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

I. Amendments to Claims

As indicated above, Applicant has amended claims 8, 9, 22 and 23 to correct minor typographical errors and submit that no new subject matter is added.

II. Allowable Subject Matter

Applicant would like to thank the Examiner for indicating on page 8 of the Office Action that claims 5, 11-12, 19 and 25-26 contain allowable subject matter. At this time, however, Applicant elects not to amend these claims to incorporate the limitations of their base claims and any intervening claims. Instead, Applicant respectfully requests

consideration of the arguments presented below in response to the rejections made to the remaining claims.

III. Response to Claim Rejections Under 35 U.S.C. § 103

Claims 1-4, 6-7, 13-18, 20-21 and 27-28 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Amrany*. Claims 8-10 and 22-24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Amrany* in view of admitted prior art in the disclosure. For at least the reasons set forth below, Applicant respectfully traverses these rejections.

Independent Claim 1 is Patentable Over Amrany

Claim 1 recites (emphasis added):

1. A method for reducing crosstalk in DSL Discrete Multi-tone (DMT) modems with the presence of other modulated signals, comprising:
receiving a signal that comprise a desired DMT signal plus an interferer from a channel;

frequency shifting the received signal to produce multiple versions of the received signal;

providing a combined crosstalk equalizer and frequency-shifted adaptive filters to reconstruct the DMT signal and reduce crosstalk noise;

downsampling the signal outputs of both the combined crosstalk equalizer and the frequency-shifted adaptive filters to reduce sampling rate; and

summing the outputs of the combined crosstalk equalizer and the frequency-shifted adaptive filters.

Applicant respectfully submit that independent claim 1 patently defines over *Amrany* for at least the reason that *Amrany* fails to disclose, teach or suggest the features emphasized above in claim 1. In alleging that *Amrany* teaches the feature of “frequency shifting the received signal to produce multiple versions of the received signal,” the Office Action states on page 3 (emphasis added):

. . . the second signal $p(t)$ is derived from the first signal $r(t)$ to create multiple independent equations that can be solved to either directly approximate the remotely transmitted signal $e(t)$, or to approximate a measure of crosstalk on the local loop, and from the measure of crosstalk approximate the transmitted signal $e(t)$. As shown in equations 2-3 (column 8 lines 1-20), because the frequency of the common mode signal $p(t)$ is different with that of the received signal $r(t)$ and because $p(t)$ is derived from the received $r(t)$, one of ordinary skill in the art would have recognized that the act of deriving $p(t)$ corresponds to the claimed frequency shifting. As further disclosed in column 7 lines 45-55, *Amrany et al.* considers only one disturbance source, however, the extension of two or more disturbers is straight forward.

Amrany teaches of utilizing a common mode signal, obtained from the local loop, to generate a second signal $p(t)$. Signals $r(t)$ and $p(t)$ are utilized to create multiple independent equations that can be solved to either directly approximate the remotely transmitted signal $e(t)$, or to approximate a measure of crosstalk on the local loop, and from the measure of crosstalk approximate the transmitted signal $e(t)$.

However, Applicant fails to find any support in *Amrany* that discloses, teaches, or suggests the claimed feature of frequency shifting the received signal to produce multiple versions of the received signal. Indeed, the Office Action admits on page 3 that *Amrany* does not explicitly teach frequency shifting the received signal to provide multiple versions of the received signal. However, Applicant respectfully disagree that “one of ordinary skill in the art would have recognized that the act of deriving $p(t)$ corresponds to the claimed frequency shifting.” The Office Action reaches this conclusion by reasoning that “because the frequency of the common mode signal $p(t)$ is different with that of the received signal $r(t)$,” the act of deriving $p(t)$ corresponds to frequency shifting.

In *Amrany*, a common mode signal is used to generate the signal $p(t)$. However, while the common mode signal is obtained from a differential signal of a local loop in the *Amrany* reference, Applicant respectfully submit that this is not the same as frequency shifting a received signal to produce multiple versions of the received signal. In response to the allegation made in the Office Action that “the frequency of the common mode signal $p(t)$ is different with that of the received signal $r(t)$,” Applicant respectfully notes that claim 1 does not recite a “frequency-shifted” received signal but rather “frequency shifting a received signal.”

Furthermore, Applicant refers to page 3 where the Office Action states (emphasis added):

“... the act of deriving $p(t)$ corresponds to the claimed frequency shifting. As further disclosed in column 7 lines 45-55, *Amrany* et al. considers only one disturbance source, however, the extension of two or more disturbers is straight forward.”

Applicant finds the pairing of these two statements to be unclear as it appears that the Office Action attempts to imply that *Amrany* teaches of deriving multiple $p(t)$ signals which the Office Action then equates to “multiple versions of the received signal” as recited in claim 1. Applicant respectfully disagrees with this conclusion and points out that the received signal $p(t)$ and the disturber signal disclosed in *Amrany* are separate signals.

The disturber signal, $u(t)$, originates from a disturber source which may be an adjacent line that is capacitively-coupled to the disturbed line. (See related text for CP 102 and 104 in FIG. 3A: “Assume that a DSL modem at CP1 102 as a disturber source that interferes [sic] or injects crosstalk onto the loop for CP2 104.”) The received signal,

$r(t)$, meanwhile, is found on the disturbed line. Thus, the two signals are different. Furthermore, the multiple disturbers in the *Amrany* reference are not the same as the “multiple versions of the received signal” recited in claim 1. *Amrany* simply does not teach of frequency shifting a received signal (*i.e.*, the signal $r(t)$ in *Amrany*) to produce multiple versions of the received signal (*i.e.*, multiple signals $u(t)$ in *Amrany*).

Accordingly, Applicant respectfully submits that independent claim 1 patently defines over *Amrany* for at least the reason that *Amrany* fails to disclose, teach or suggest the emphasized features in claim 1 above.

Dependent Claims 2-14 are Patentable Over Amrany

Applicant submits that dependent claims 2-14 are allowable for at least the reason that these claims depend from an allowable independent claim. See, *e.g.*, *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

Independent Claim 15 is Patentable Over Amrany

Claim 15 recites (emphasis added):

15. An apparatus for reducing crosstalk in DSL Discrete Multi-tone (DMT) modems with the presence of other modulated signals, comprising:
 - a receiver for receiving a signal that comprises a desired DMT signal plus an interferer from a channel;
 - a frequency-shifter that produces multiple versions of the received signal;**
 - a combined crosstalk equalizer and frequency-shifted adaptive filters to reconstruct the DMT signal and reduce crosstalk noise;
 - downsamplers to downsample the signal outputs of both the combined crosstalk equalizer and the frequency-shifted adaptive filters to reduce sampling rate; and
 - a combiner that sums the outputs of the combined crosstalk equalizer and the frequency-shifted adaptive filters.

Applicant respectfully submit that independent claim 15 patentably defines over *Amrany* for at least the reason that *Amrany* fails to disclose, teach or suggest the features emphasized above in claim 15. The Office Action applies the same arguments used to reject claim 1 to reject claim 15. Applicant respectfully submit that *Amrany* does not teach of producing multiple versions of the received signal by using a frequency-shifter. The Office Action states on page 3 (emphasis added):

. . . because the frequency of the common mode signal $p(t)$ is different with that of the received signal $r(t)$ and because $p(t)$ is derived from the received $r(t)$, one of ordinary skill in the art would have recognized that the act of deriving $p(t)$ corresponds to the claimed frequency shifting. As further disclosed in column 7 lines 45-55, *Amrany et al.* considers only one disturbance source, however, the extension of two or more disturbers is straight forward.

However, as discussed above for claim 1, the derivation of the common mode signal $p(t)$ from a differential signal is not the same as producing multiple versions of a received signal by frequency-shifting the received signal. Furthermore, the discussion of two or more disturbers in *Amrany* is not equivalent to “multiple versions of the received signal” as recited in claim 15.

Accordingly, Applicant respectfully submits that independent claim 15 patentably defines over *Amrany* for at least the reason that *Amrany* fails to disclose, teach or suggest the emphasized features in claim 15 above.

Dependent Claims 16-28 are Patentable Over Amrany

Applicant submits that dependent claims 16-28 are allowable for at least the reason that these claims depend from an allowable independent claim. See, e.g., *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

IV. Prior Art Made of Record

The prior art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

CONCLUSION

Applicant respectfully submits that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 50-0835.

Respectfully submitted,

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